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graduate students in geology, chemistry and physics. But such work should follow the introductory course. In this advanced course a full treatment of the Miller indices, axial ratios, etc., finds its proper place. Would it not be the height of folly to recommend that extended philological researches be introduced into the beginning course of one of the modern languages? At any rate, Professor Rogers's statement that 'without something of the sort (meaning crystal measurement, calculation and drawing) the time given to crystallography may almost be a waste of time unless it is taken up at some future time' is to my mind altogether too sweeping and certainly needs qualification. I would like to ask what student of mineralogy has not found a course in elementary crystallography of the highest value and interest, even though it did not include the work supposed by Professor Rogers to be of paramount importance.

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November 20, 1906.

CHAMBERLIN AND SALISBURY'S TEXT-BOOK OF
GEOLOGY.

THE review of the three-volume 'Text-book of Geology' by Professors Chamberlin and Salisbury in a recent number of *SCIENCE*, is likely to convey to the general reader an erroneous impression of that publication. Certain idiosyncrasies of style and little errors of detail, some of which are not real, are dwelt upon at such length that one becomes imbued with the idea that such mistakes are abundant and that they detract largely from the value of the text. It is natural that in a book of this size a number of things may be found worthy of criticism, and especially is this true of little matters which are likely to escape notice in reading the proof of the first edition. Mistakes of this class are better brought to the attention of the authors through the medium of a personal communication than by making them the subject of complaint in the public prints. Enough of such details can be found in any work to convey a wrong impression of the whole, if they are given so large a

space that the main features of the work receive subordinate notice. It should be the function of a review to give the reader a correct understanding of the important and readable qualities of the book, whether they are good or otherwise, and not simply to recount trivialities. While in this case the reviewer finally gives adequate expression of his appreciation of the high value of the books concerned, this expression is prefaced by so many criticisms of details that the effect of his commendation is largely lost.

Some of the criticisms affect mere oversights in proof-reading, which are bound to occur in any publication of this magnitude. Several of these have been corrected in the second edition of volume I. Such an error was the use of 'syncline' for 'anticline' as pointed out by Dr. Branner.

A large number of the specific faults mentioned in the review are found on closer inspection to be imaginary rather than real, and one is forced to conclude that the reviewer was somewhat hasty in his perusal of the text. Of this nature is the criticism of the statement that "theoretically the rotation of the earth should increase erosion on the right bank of streams in the northern hemisphere and on the left bank in the southern," because "no reference is made to the direction of the streams," for this tendency is not dependent upon the direction of the streams, and the authors were correct in leaving their statement unqualified in this particular.

The reviewer takes exception to the statement that the advent of the Ammonites occurred in the Permian and cites Monograph XLII., U. S. G. S., as showing that they were abundant in the coal measures. The genera described in that work, however, belong to the types most widely known as Goniatites and Ceratites, the occurrence of which was duly mentioned by the authors. These are ammonoids, of course, but not Ammonites as the term is generally understood. The specific statements of the authors are therefore discriminative.

The statement of the authors that 'differences in density of sea water are due to differences in temperature and salinity' is criti-

cized on the ground that salt is not the only mineral in solution. Probably few students would understand 'salinity' to refer solely to common salt, since it is commonly used in its broader sense in scientific treatises.

It is a matter of surprise that Professor Branner should say that 'no mention is made of increase of temperature' in connection with the deposition of mineral matter from solution, for the influence of temperature on solution and deposition is distinctly recognized by the statement that 'reduction of temperature often causes deposition' with the added statement that 'in general, hot water is a better solvent of mineral matter than cold,' with the further recognition in a footnote (p. 213, 1) of exceptional cases, lime carbonate being specified. The statement might have been more fully explained, but doubtless the authors had in mind at all times the necessity of keeping the length of the treatise within reasonable limits.

The reviewer makes the authors affirm that 'the deposition of mineral matter from boiling water is the same process as that by which it is deposited upon evaporation.' The statement in the text is that 'the process of deposition by evaporation is illustrated when water is boiled,' which is obviously true. The statement might have been made clearer by amplification; yet there is no reason to give the abbreviated statement an adverse interpretation.

Complaint is also made that 'in discussing river terraces' (p. 198) 'no mention is made of a stream swinging back and forth across its flood plain.' On the page cited only the exceptional modes of terrace-formation are outlined, whereas if the reviewer had glanced at pp. 196-197 he would have found the normal process of terrace-making fully discussed.

Another group of criticisms is based upon misinterpretation of the text, where the true meaning is obvious upon careful reading. Perhaps the authors might have explained their statements, so as to forestall all possible misinterpretations, thus increasing the size of the volumes, but no doubt it was expected that the student would find the correct interpretation from briefer statements which were some-

times capable of being twisted into another meaning.

With reference to the statement that 'faults rarely show themselves in the topography of the surface' the reviewer says that 'a California geologist could hardly be expected to uphold such a statement with a straight face.' The original sentence is 'since faults rarely show themselves in the topography of the surface, their detection and measurement are usually based on the study of the relations of the beds involved.' Topographic features which are known from other evidences to have arisen from faulting, but which could not be proved to have originated in that way except by the other means indicated, are clearly not embraced in the statement. On a previous page, fault scarps are discussed and the fact stated that they are, before they become obscured by erosion, notable topographic features. While it is unquestionably true that in some parts of the world recent fault scarps are still prominent, it may also be affirmed without hesitation that the vast majority of faults have no topographic expression.

In discussing the formation of deltas, the statement is made in the text that 'the projected stream current is ineffective, all load except that in suspension is dropped and a depositional slope is established.' The reviewer assumes that matter in solution is meant, whereas obviously the material rolled or pushed along the bottom is referred to. This is clearly implied by the context, for a little below it is stated that 'the finest sediment will be carried beyond the steep slope and conform to the topography of the bottom beyond.' The wording of the sentences could have been improved and has been so altered in the second edition of volume I., which the reviewer seems not to have had before him.

The criticism of the authors' statement with reference to fiords is hardly deserved, since subsidence is explicitly recognized as a factor in fiord-making in several places in the volumes. On the particular page cited the question of the effect of glaciation in the development of fiords was the special case under discussion.

Most of the above criticisms relate to small

matters, but the following touches one of much importance. The reviewer says that the reasons are not clear for the inference that 'a vegetal covering of the land extended as far back in the history of the earth as clay slates, quartzose sandstones and limestones formed the prevailing sediments.' He proceeds to give reasons for thinking that decomposition and the deposition of limestone may take place without the aid of vegetation, overlooking the meaning of the phrase 'the prevailing sediments,' and that of the context, in which it is stated that "if the surface be bare of vegetation, the crystalline rocks are usually disaggregated before they are decomposed, since destructive action occurs best at the junctions of crystals and along cleavage lines and hence the crystals are usually separated from one another before they are fully decomposed. In the absence of a covering to hold them in place until they are decomposed they are apt to be washed away, and the resulting deposit consists in considerable part of grains of feldspar, mica, hornblende and other minerals which do not usually occur in well decomposed sediments." It is difficult to see how a careful student can fail to note that there is here a recognition of decomposition, on a small scale, independent of vegetation. The point to be emphasized was, on the other hand, that in the absence of the protection of a vegetal covering mechanical disintegration so far overpowers decomposition that in most cases the disaggregated particles on the naked surface are carried away by erosion, and give rise to a formation which is only partially decomposed. When, therefore, the 'prevailing formations'—not exceptional or possible ones—consist of the products of *mature decomposition* (II., p. 199, where the matter is again stated) it is reasonable to suppose that the land possessed a vegetal covering.

The authors are scored for not treating the Pacific coast geology of Mesozoic and Tertiary times more fully. It may be that they would reply that it is because relatively few good sections of the strata of the Pacific coast have been published. Nevertheless, sections from that part of the country, illustrating the systems referred to appear as figures on no

less than twelve pages in volume III. and additional columns are furnished at the close of that volume. These sections receive as much consideration in an interpretative way as one could expect in a treatise so cosmopolitan in its field. Not improbably the geologists of Dakota think that the geology of Dakota has not received adequate recognition, while the geologists of Texas have the same feeling with reference to the geology of their state, and so on indefinitely. It is but natural that those regions which have been most thoroughly investigated should receive the largest share of attention.

It is in view of such points as these that the reviewer takes occasion to say that 'these are oversights which must annoy teachers of geology.' It is the present writer's observation, in using these volumes as a text-book with students, that the number of misinterpretations put upon the text is extremely small; and while teachers of geology may regret any and every imperfection in the volumes they may well be gratified that so complete and readable a treatise is now available.

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November 7, 1906.

THE DETERMINATION OF THE TYPES OF GENERA.

A CORRECTION.

IN my recent article on the 'Determination of the Types of Genera' the sentence,² "As *gryphus* was the last species removed from the genus *Vultur* it is its type by elimination * * *," requires modification. In reality *gryphus* was the second species removed from the genus, but the last species to be disposed of by assignment to a special genus of its own, which is the statement intended. From the modern standpoint, no two of the original six species of *Vultur* were congeneric, and *gryphus* was the last species to be provided with a distinctive generic name.

J. A. ALLEN.

¹ "The 'Elimination' and 'First Species' Methods of Fixing the Types of Genera," SCIENCE, N. S., Vol. XXIV., No. 624, pp. 773-779, November 14, 1906.

² Page 776, at middle of first column.